



Express Mail Label
No. EL416126852US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor: KOCH, Earl D. Art Group: 3671
Serial No.: 09/553,492 Examiner: K. Markovich
Filing Date: April 19, 2000 Atty Docket: 27136-01
For: TEMPORARY RAMP

RECEIVED
AUG 22 2002
GROUP 3600

AFFIDAVIT OF EARL D. KOCH

I, Earl D. Koch, pursuant to 37 C.F.R. § 1.132, do state and declare as follows based upon my own personal knowledge and/or belief:

1. I am the inventor of the invention disclosed and claimed in the above identified U.S. Patent Application.
2. I have been involved in the field of road repair and construction for over 22 years.
3. I am currently a construction dispatch manager for United Contractors Midwest, one of the largest asphalt and concrete paving firms in the Midwest having a business address of P.O. Box 166, Tremont, Illinois 61567. I am responsible for scheduling and organizing company wide crews and machinery for UCM's road repair and construction projects.
4. During my 22 years of experience in road repair and construction, I have acquired knowledge and understanding of the specifications, standards, rules and regulations of federal and various state, county and municipal transportation authorities for road repair and construction. I have also acquired knowledge and understanding of the approved and accepted road repair and construction practices employed by contractors to comply with the specifications, standards, rules and regulations of these various transportation authorities.
5. Many roadways include various structures embedded in the roadway surface, such as manhole risers, storm sewer risers and other risers which allow access to water mains and

other utilities. These risers are typically covered by a steel cover plate which is substantially flush with the finished roadway surface, but which can be removed to allow access into the risers as needed. Accordingly, during construction of these roadways the elevations of the tops of these risers must be placed such that they will be substantially flush with the elevation of the finished roadway surface so that vehicles may travel smoothly over the embedded structures.

6. Additionally, it is common for a roadway under construction to join with a finished roadway which results in an elevation differential or drop-off from the finished roadway elevation to the unfinished roadway. Thus, until the finished roadway surface is placed, the elevation differential creates an obstruction to vehicles traveling between the finished roadways and the unfinished roadway.

7. Similarly, roadway repair projects often involve the removal and replacement of the top lay of the asphalt pavement on the roadway surface. The removal of the roadway surface is performed by milling machines having a cutting or grinding mandrel which mills off the top two to three inches of asphalt. The removal of the top layer of asphalt pavement by the milling machine leaves the risers and adjacent or intersecting finished roadway surfaces elevated above the milled roadway surface. Accordingly, until the final roadway surface is replaced these elevated risers and adjacent or intersecting roadway surfaces create obstructions to vehicles traveling on, into or from the milled roadway surface.

8. Regulations by the federal, state, county or municipal transportation authorities typically require that any obstructions in, along, across or projecting into the path of travel of vehicles traveling on, into or from the unfinished roadway must have a gradually inclining approach and/or gradually declining departure to/from the obstruction in order to avoid damage to the vehicles which must travel over the obstructions.

9. The amount of acceptable slope to or from an elevated obstruction may vary between the different transportation authorities, but, typically, the amount of slope will vary inversely with the expected speed of the vehicles traveling on the unfinished roadway. For example, the slope (i.e., the ratio of rise over run) may be as great as 1:5 (i.e., a 20% grade) for vehicle traffic traveling at speeds between 0-20 mph; or 1:20 (i.e., a 5% grade) for vehicle traffic traveling at speeds between 20-50 mph; or as little as a 1:50 (i.e., a 2% grade) or a 1:80 (i.e., a 1.25% grade) for vehicle traffic traveling at speeds over 50 mph.

10. To comply with the requirements of providing gradual approaches and/or departures to/from the obstructions, it has been the common practice for road repair and construction contractors to place hot-mix or cold-mix asphalt pavement adjacent to and/or around the elevated obstruction to create a temporary ramp of the specified slope.

11. The practice of installing temporary asphalt pavement ramps involves a variety of machinery and many workers during installation. Furthermore, these temporary asphalt pavement ramps must be broken up and removed before the final layer of pavement can be placed. Thus, such ramps are wasteful of materials and are relatively costly in labor and equipment.

12. I started a business under the name E Z Road, Inc. to begin manufacturing and selling temporary ramps comprised of interlocking ramp segments as disclosed and claimed in my above identified patent application. To date, E Z Road, Inc. has manufactured and sold two different types of segmented temporary ramps, namely, (1) donut-shaped temporary ramps for placement around manhole risers, wherein the donut-shaped ramps are comprised of four individual, interlocking ramp segments, and (2) butt-joint temporary ramps for placement against

substantially linear obstructions, such as construction joints, wherein the butt-joint ramps are comprised of individual, rectangular-shaped segments.

13. As disclosed and claimed in my above identified patent application, the ramp segments include a substantially horizontal lower surface adapted for contacting the roadway surface during use, a sloping upper surface (preferably sloped at least 1:20) adapted for contact with vehicle wheels during use, and side edges having complementary coupling formations adapted for removably interlocking with opposing side edges of adjacent ramp segments.

14. Each temporary ramp segment is made of an elastomeric material and is designed to be small enough such that the segments will fit in the back of a conventional pick-up truck bed and be light enough such that the segments can be installed and removed by a single workman.

15. U.S. Patent No. 5,308,188 issued to Shaftner on May 3, 1994 (hereinafter "Shaftner '188") (See Ex. A). Shaftner '188 discloses a single piece temporary ramp for use on a roadway under repair and/or construction. The single piece temporary ramps are disclosed as being made of an elastomeric material having a centrally located opening or an eccentrically positioned opening therein for placement around utility access structures such as manholes and gas, water and sewer utility access holes.

16. The Shaftner '188 patent discloses that a conventional manhole riser is 25 3/8 inches in diameter, and therefore the preferred temporary ramp is disclosed as having a center opening of approximately 25 1/2 inches. Shaftner '188 also discloses that the single piece ramp is preferably 2 inches thick at the opening and approximately 1/2 inches thick at the outer edge with a preferred slope ratio of 1 to 6. Using this slope, the distance from the edge of the opening to the outer edge of the ramp is approximately 12 inches, resulting in an overall diameter of the single piece ramp of approximately 48 inches. (See Ex. A, col. 3, lines 1-21).

17. Although the Shaftner '188 patent suggests that the single-piece ramp may formed in any desired shape or cut as needed for placement around manholes near curbs, for example, the Shaftner '188 patent does not disclose or otherwise teach segmenting the single-piece, manhole ramp to provide interlocking ramp segments as disclosed and claimed in my above-identified pending patent application.

18. The specification of the Shaftner '188 patent has been publicly available since at least May 3, 1994 (Ex. A).

19. The Shaftner '188 ramps have been exclusively manufactured under a license by Work Area Protection Corp ("WAPC") which purports to be the "international leader in traffic control and work zone safety devices." (See Ex. B). According to WAPC's product literature, the single-piece ramps have a slope between 1:5 and 1:6, are manufactured out of 100% recycled rubber, and are 2 inches thick with a 48 inch outside diameter and a 26 inch inside diameter. Each single-piece ramp weighs 68 pounds. (See Ex. C).

20. The single-piece Shaftner '188 ramps as manufactured by WAPC may be suitable for temporary ramps around manholes where the required ramp slope is around 1:6. However, as identified above, where the ramp slope must be less than 1:20 for use on roadways where the expected vehicle traffic speed may approach or exceed 50 mph, the single-piece ramp disclosed in Shaftner '188 and manufactured by WAPC would have to be approximately 106 inches in diameter (8'-10") and would weigh well over 120 pounds. Thus, such a large single-piece ramp would not fit in the back of a conventional pickup truck and due to its size and weight, it would be extremely cumbersome and difficult to handle by a single workman.

21. U.S. Patent No. 4,373,306 issued to Rech on February 15, 1983. (See Ex. D) The Rech '306 patent discloses an assembly of structural elements for a landing mat comprised of sections having interlocking male and female coupling formations. (Ex. D).

22. The specification of the Rech '306 patent has been publicly available since at least February 15, 1983. (Ex. D).

23. Despite the fact that the disclosures of the Rech '306 and Shaftner '188 have been publicly known for nearly twenty years and eight years respectively, to my knowledge, neither WAPC (the purported "international leader in traffic control and work zone safety devices") nor any other manufacturer, has ever offered a manhole ramp or butt-joint ramp comprised of segmented interlocking ramp segments for use on a roadway surface during road repair or construction operations as disclosed and claimed in my above identified pending patent application.

24. On May 24, 2002, I met with Mr. Jeff Smith of WAPC. Mr. Smith is the Vice President of Product Account Development for WAPC. At this meeting, I demonstrated my segmented butt-joint temporary ramps and my segmented manhole temporary ramps and discussed the advantages and features my invention has over WAPC's single-piece manhole ramps. Mr. Smith was extremely interested in my invention, particularly with respect to the temporary butt-joint ramps. During our first meeting, Mr. Smith made an offer to obtain an exclusive license to my invention. Our negotiations are ongoing.

25. The fact that WAPC, the purported "international leader in traffic control and work zone safety devices" and the exclusive licensee of the Shaftner '188 patent, is also considering obtaining an exclusive license to my invention, demonstrates WAPC's industrial respect for my invention and strongly supports the finding that my invention satisfies a long-felt

but unresolved need not met by the Shaftner '188 ramps or other devices or practices known to those of ordinary skill in the art.

26. In little more than twelve months since E Z Road, Inc. began selling the segmented temporary ramps as disclosed and claimed in the above-identified pending patent application, E Z Road, Inc. has sold over 147 butt-joint ramp segments and manhole ramp segments to various road repair and construction contractors in the central Illinois area, resulting in gross revenues of over \$52,000.00.

27. To date, E Z Road, Inc. has not advertised in any national trade journals or publications. Rather, all of the above identified sales are a result of my direct promotion and demonstration of the E Z Road temporary ramps to local contractors and by word of mouth.

28. Since I made each of these sales, I can personally attest that each of these sales were a result of the advantages and features offered by my invention over the single-piece Shaftner '188 ramps as manufactured by WAPC and over the conventional asphalt pavement ramps -- namely, that the E Z Road ramps: (1) can be quickly and easily installed and removed by a single laborer without the need for equipment to install and remove the ramp, and (2) can be easily transported in segments for reuse on another job site in a conventional pickup truck bed.

29. As stated in the concurrently filed affidavits of various individuals involved in the road repair and construction industry who have purchased and used the E Z Road segmented temporary ramps, there has been a long felt but unresolved need for a temporary ramps comprised of individual, interlocking segments that can be easily transported to and from the required site in a conventional pickup truck and easily installed and removed by a single workman without the need for lifting equipment or other specialized equipment.

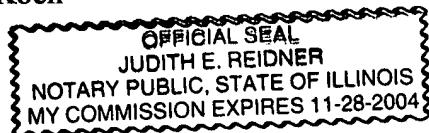
30. Due to this long felt but unresolved need for segmented temporary ramps and the acceptance and acclaim received from the contractors that have purchased and used the E Z Road segmented temporary ramps, and due to the cost savings that can be realized using the E Z Road segmented ramps, it is my firm belief that once other road construction contractors become aware of the E Z Road segmented ramps, the sales of this product will experience exponential growth.

Date: July 31, 2002

Earl D Koch
Earl D. Koch

STATE OF Illinois)
COUNTY OF Yangwill)

) ss.:)



Subscribed and sworn to me on this 31 day of July, 2002 by
Earl D. Koch.

Judith E. Reidner
Notary Public

782033.1



WORK AREA PROTECTION CORPORATION

Tough enough
for any work area

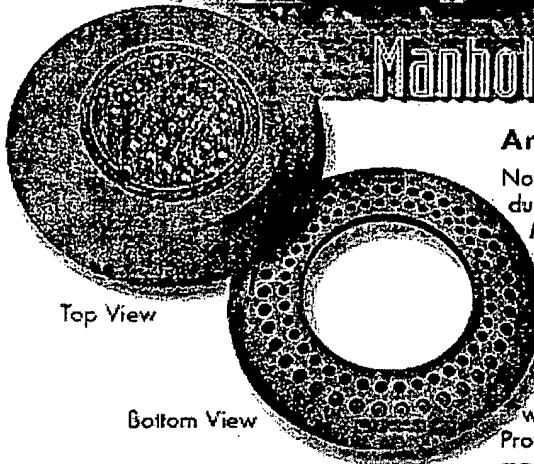
Manhole Riser Protection Ring

An easier alternative to cold patching

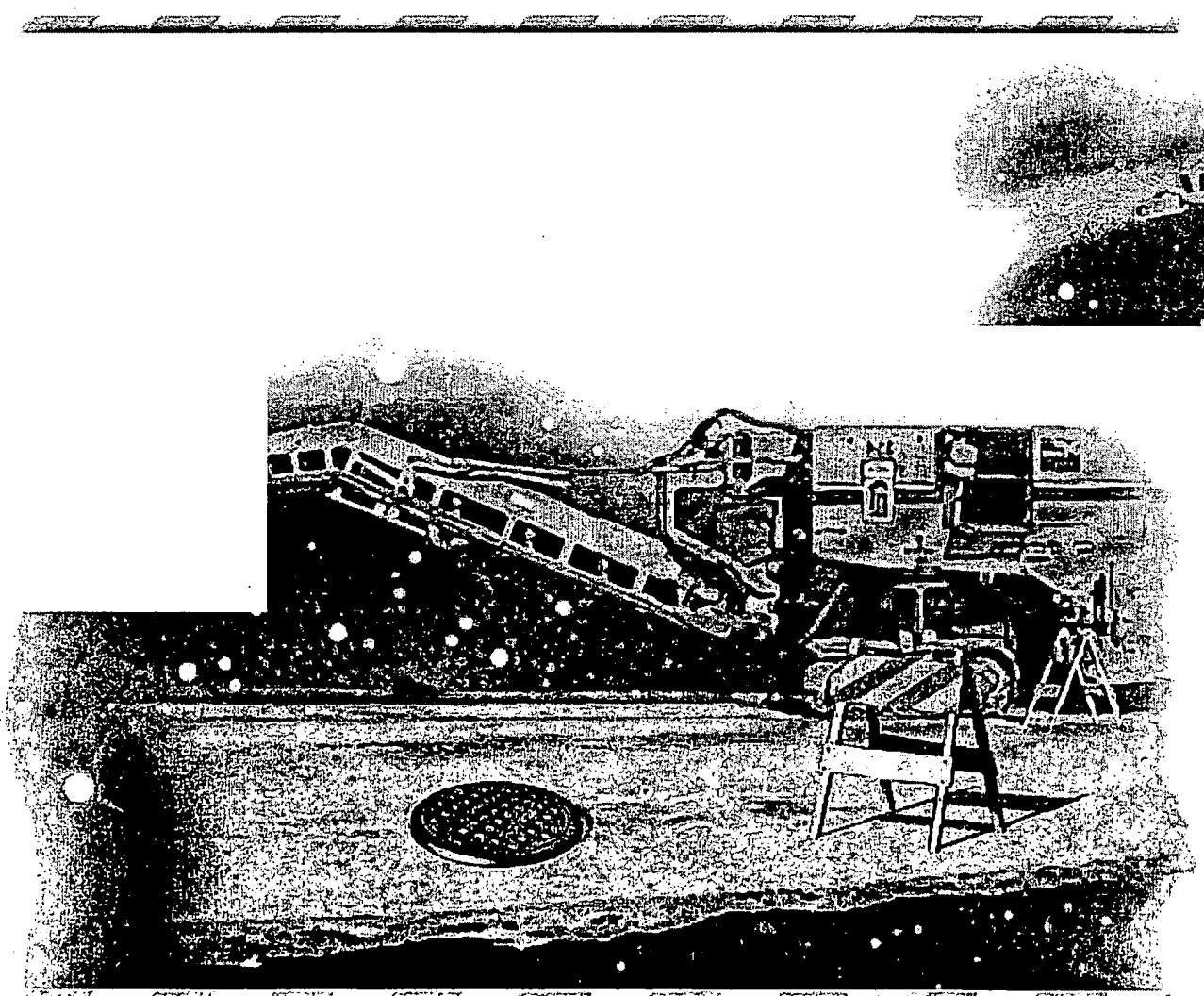
Now you can smooth over those exposed manhole risers during road construction projects in a matter of seconds.

Made of tough, durable rubber, these Protector Rings fit securely around manhole risers. They won't shift or slip. Just drop them into place and remove them simply by picking them up.

You'll save money too, because these Protector Rings can be used again and again. They can easily be stacked to save space. Their subtle gradient design enables motorists to drive over exposed manhole risers smoothly and safely without damaging their tires or vehicles. What's more, these Protector Rings come in different sizes to accommodate manhole risers of different diameters.



Below illustrates the simple use of this revolutionary time/ money saving product.



Last Updated:
27-Jun-2002

- eliminates need for cold patching

- reusable

EXHIBIT

A

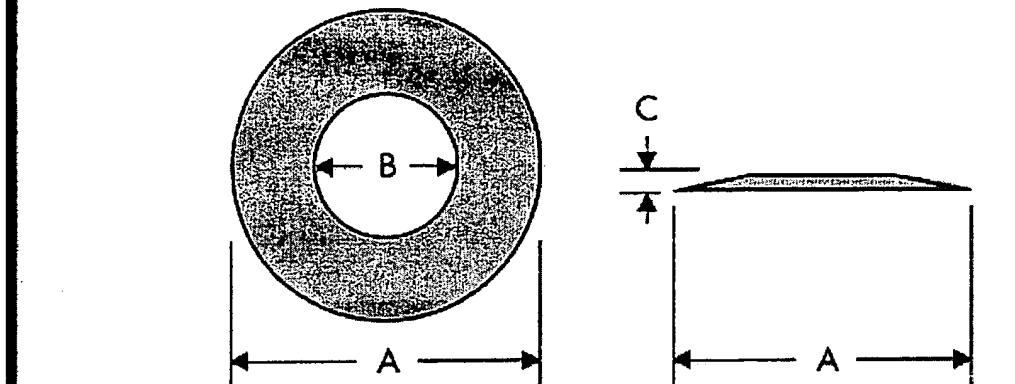
7/22/02

- fast, simple installation
- snug fit
- provides smooth riding

- stackable for storage
- made of durable 100% recyclable rubber
- available in different sizes

SPECIFICATIONS:

| Model Number | Outer Diameter | Inside Clearance | Thickness | Weight |
|--------------|----------------|------------------|-----------|--------|
| | A | B | C | |
| MPR 26 | 48" | 26" | 2" | 68 lbs |
| MPR 10 | 29" | 10" | 2" | 29 lbs |



Material: 100% recycled rubber

Density: 0.6 oz/cu in. ASTM C642

Fabrication: compression molded deposit

Durometer harness: 66A ASTM D2240

Tensile strength: 300 psi ASTM D412

Elongation: 90% ASTM D412

Brittleness: 40°F ASTM D746

Coefficient of thermal expansion: 8 x10.5 in/in/F ASTM C531

Savings per unit installation

| METHOD | Cost per Manhole Avg. Price per Contractors |
|---|--|
| Manhole Protector Ring (Price includes labor and cost of MPR using a life cycle of 50 times used) | \$ 5.75 |
| Take out riser and plate it | \$500.00 |
| Leave existing apron | \$200.00 |
| Cold Patch or Hot Mix | \$200.00 |
| Use Grindings (Equipment and Labor, excludes liability) | \$ 30.00 |
| Use Barricade (Barricade Life at 10 times, excludes liability) | \$ 5.45 |

The MUTCD requires that a manhole exposed during a milling operation be protected by a slope of asphalt if the manhole is exposed over .5".

Reusable Manhole Protector Ring is recommended to give protection to manholes exposed up to 2.5" high.

Part # - MPR26 - 26" hole diameter, 2" high and weighs 68 LB.

Part # - MPR10 - 10" hole diameter, 2" high and weighs 29 LB.

Exclusively manufactured under Patent #5,308,188

Download Specifications Flyer PDF. Click Here!

If you have a problem downloading this file:
Hold down the Shift key (Windows and UNIX) or
the Option key (MacOS) when clicking the link above.

You need Acrobat Reader (FREE) to view PDFs . . .



See your Work Area Sales Representative for available sizes and pricing.

[This site is best viewed with Internet Explorer 4.0 and higher at 1024x768]
Forward comments to [here](#).

BEST AVAILABLE

Manhole Protector Ring

Cost effective

Eliminates need
for cold
patching

Fast, simple
installation

Grip tight design

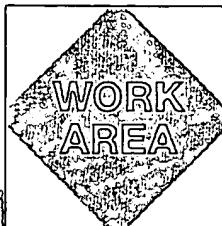
Provides for
smooth riding

Reusable

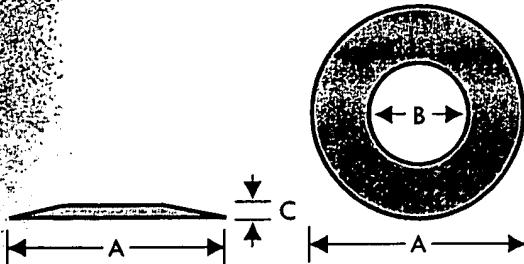
Stackable
for storage

Made of durable
100% recyclable
rubber

Available in
various sizes



Manhole Protector Ring Specifications



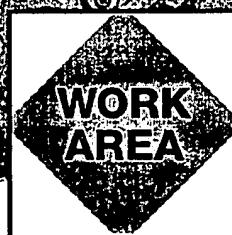
| Model Number | Outer Diameter | Inside Clearance | Thickness | Weight lbs. |
|--------------|----------------|------------------|-----------|-------------|
| | A | B | C | |
| MPR 26 | 48" | 26" | 2" | 68 |
| MPR 10 | 29" | 10" | 2" | 29 |

An easier alternative to cold patching

Now you can smooth over those exposed manhole risers during road construction projects in a matter of seconds. Made of tough, durable rubber, these Protector Rings fit securely around manhole risers. They won't shift or slip. Just drop them into place and remove them simply by picking them up. You'll save money too, because these Protector Rings can be used again and again. They can easily be stacked to save space. Their subtle gradient design enables motorists to drive over exposed manhole risers smoothly and safely without damaging their tires or vehicles. What's more, these Protector Rings come in various sizes to accommodate manhole risers of different diameters.

| | | | |
|---------------------|------------------------------|-----------------------------------|------------------------------|
| Material: | 100% recycled rubber | Tensile strength: | 300psi ASTM D412 |
| Fabrication: | compression molded composite | Elongation: | 90% ASTM D412 |
| Density: | 0.6 oz/cu in. ASTM C642 | Brittleness: | -40°F ASTM D746 |
| Durometer hardness: | 65A ASTM D2240 | Coefficient of thermal expansion: | 8x10 ⁻⁵ ASTM C531 |

Grip tight design ensures Manhole Protector Rings won't shift or slip.



WORK AREA PROTECTION CORPORATION

www.workareaprotection.com e-mail: workarea@workareaprotection.com

A Division of Stabler Companies, Inc.

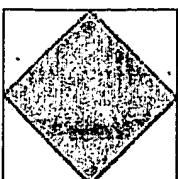
2500 Production Drive P.O. Box 4087

St. Charles, IL 60174-9081

630-377-9100

Fax: 630-377-9270

Ordering: 800-327-4417



WORK AREA PROTECTION CORPORATION

THE INTERNATIONAL LEADER IN TRAFFIC CONTROL AND WORK ZONE SAFETY DEVICES

[Home](#)

[News](#)

[Products](#)

[Links](#)

[Careers](#)

[Email Us](#)

Welcome to the Work Area Protection Corporation Web Site. For over 30 years, Work Area has been manufacturing traffic control devices and work zone safety products, meeting and exceeding the needs of our most demanding customers. The success of our business is built on our dedication to quality products, good service, and support of our distributor network. Please make a selection to learn more information on the wide range of traffic safety and work zone products that we provide around the world.



****NEW**** Plastic Sign Blanks ****NEW****



****NEW**** Manhole Protector Ramp ****NEW****



****NEW**** Pole Light Bracket ****NEW****



Traffic Cones, Reflective Cone Collars, Strobe Cones, and Accessories



Plastic Channelizer Drums



Solar Message Center, Solar Recharged Variable/Changeable Message Sign Trailer



Arrowmaster IV Arrowboard Trailer, Solar Recharged Advanced Warner



Cobra Safety Alert Traffic Warning System



Pyralights- Automotive Warning and Emergency Lights, Strobes and Revolving Lights



Vehicle Mounted Arrowboards, Directional Arrows, Light Bars



Temporary Sign Stands, Signs, Barricades, Manhole Lifts & Guards and Accessories



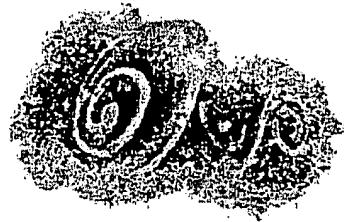
Last Updated:
28-Mar-2002
3:15 PM

ATSSA MEMBER FOR OVER 20 YEARS

Contact Information

Sales Contacts

Telephone: (630)-377-9100
Orders: (800)-327-4417
Fax: (630)-377-9270



Postal address:

PO BOX 4087, ST. CHARLES,
IL 60174

EXHIBIT

B

1000

7/22/02

Email:

General Information: workarea@workareaprotection.com

4996

-- This site is best viewed with Internet Explorer 4.0 and higher at 1024x768 --
Forward comments to [here](#).



WORK AREA PROTECTION CORPORATION

Tough enough
for any work area

[Home](#)

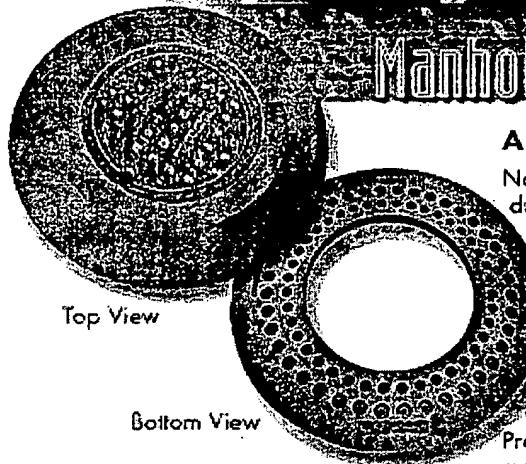
[News](#)

[Products](#)

[Links](#)

[Careers](#)

[Email Us](#)



Manhole Riser Protection Ring

An easier alternative to cold patching

Now you can smooth over those exposed manhole risers during road construction projects in a matter of seconds.

Made of tough, durable rubber, these Protector Rings fit securely around manhole risers. They won't shift or slip. Just drop them into place and remove them simply by picking them up.

You'll save money too, because these Protector Rings can be used again and again. They can easily be stacked to save space. Their subtle gradient design enables motorists to drive over exposed manhole risers smoothly and safely without damaging their tires or vehicles. What's more, these Protector Rings come in different sizes to accommodate manhole risers of different diameters.

Below illustrates the simple use of this revolutionary time/ money saving product.

BEST AVAILABLE COPY



* eliminates need for cold patching

* reusable

EXHIBIT

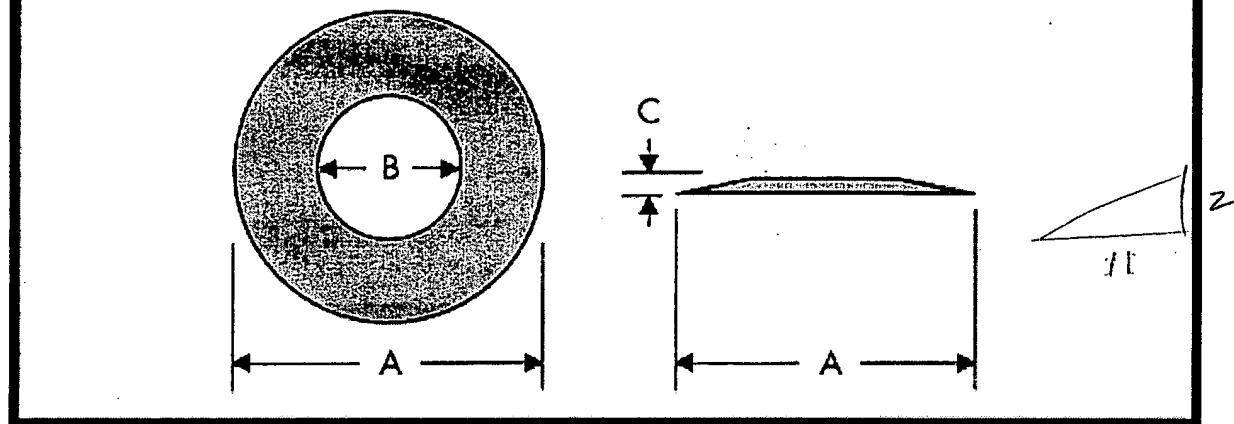
C

- fast, simple installation
- snug fit
- provides smooth riding

- stackable for storage
- made of durable 100% recyclable rubber
- available in different sizes

SPECIFICATIONS:

| Model Number | Outer Diameter | Inside Clearance | Thickness | Weight |
|--------------|----------------|------------------|-----------|--------|
| | A | B | C | |
| MPR 26 | 48" | 26" | 2" | 68 lbs |
| MPR 10 | 29" | 10" | 2" | 29 lbs |



Material: 100% recycled rubber

Density: 0.6 oz/cu in. ASTM C642

Fabrication: compression molded deposit

Durometer harness: 66A ASTM D2240

Tensile strength: 300 psi ASTM D412

Elongation: 90% ASTM D412

Brittleness: 40°F ASTM D746

Coefficient of thermal expansion: 8 x10.5 in/in/F ASTM C531

Savings per unit installation

| METHOD | Cost per Manhole Avg. Price per Contractors |
|---|--|
| Manhole Protector Ring (Price includes labor and cost of MPR using a life cycle of 50 times used) | \$ 5.75 |
| Take out riser and plate it | \$500.00 |
| Leave existing apron | \$200.00 |
| Cold Patch or Hot Mix | \$200.00 |
| Use Grindings (Equipment and Labor, excludes liability) | \$ 30.00 |
| Use Barricade (Barricade Life at 10 times, excludes liability) | \$ 5.45 |

The MUTCD requires that a manhole exposed during a milling operation be protected by a slope of asphalt if the manhole is exposed over .5".

Reusable Manhole Protector Ring is recommended to give protection to manholes exposed up to 2.5" high.

Part # - MPR26 - 26" hole diameter, 2" high and weighs 68 LB.

Part # - MPR10 - 10" hole diameter, 2" high and weighs 29 LB.

Exclusively manufactured under Patent #5,308,188

Download Specifications Flyer PDF. Click Here!

If you have a problem downloading this file:
Hold down the Shift key (Windows and UNIX) or
the Option key (MacOS) when clicking the link above.

You need Acrobat Reader (FREE) to view PDFs  Adobe Acrobat Reader

See your Work Area Sales Representative for available sizes and pricing.

[This site is best viewed with Internet Explorer 4.0 and higher at 1024x768]
Forward comments to [here](#).

BEST AVAILABLE

Manhole Protector Ring

Cost effective

**Eliminates need
for cold
patching**

**Fast, simple
installation**

Grip tight design

**Provides for
smooth riding**

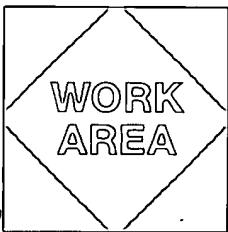
Reusable

**Stackable
for storage**

**Made of durable
100% recyclable
rubber**

**Available in
various sizes**

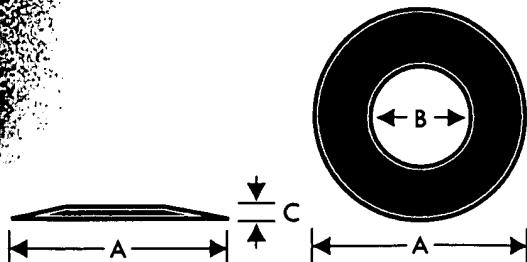
**Tough enough
for any work area**



Manhole Protector Ring Specifications

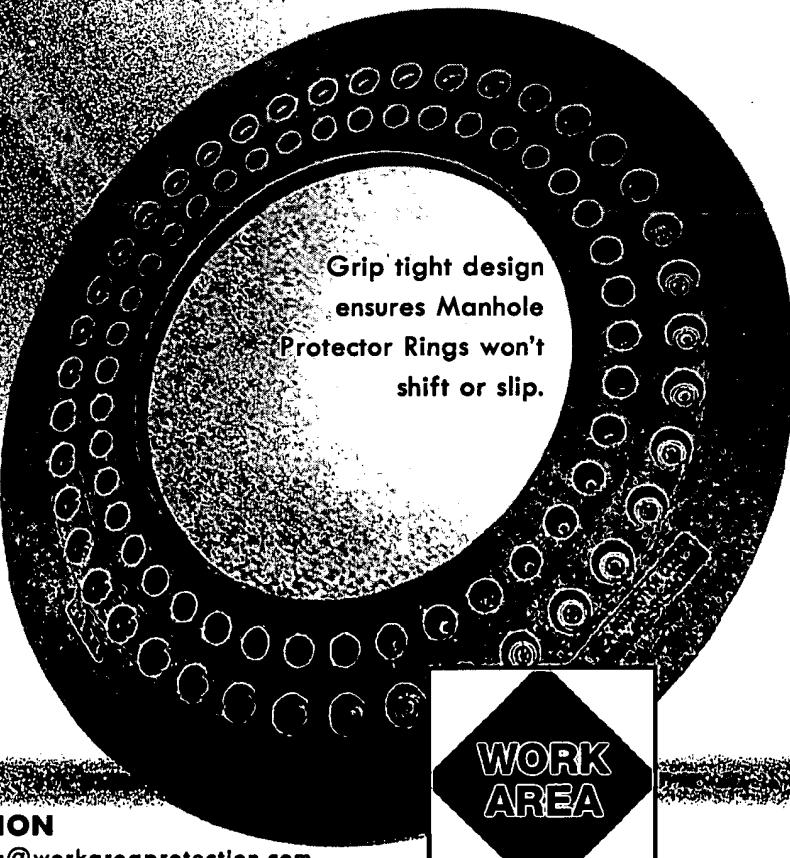
An
easier
alternative
to cold
patching

Now you can smooth over those exposed manhole risers during road construction projects in a matter of seconds. Made of tough, durable rubber, these Protector Rings fit securely around manhole risers. They won't shift or slip. Just drop them into place and remove them simply by picking them up. You'll save money too, because these Protector Rings can be used again and again. They can easily be stacked to save space. Their subtle gradient design enables motorists to drive over exposed manhole risers smoothly and safely without damaging their tires or vehicles. What's more, these Protector Rings come in various sizes to accommodate manhole risers of different diameters.



| Model Number | Outer Diameter | Inside Clearance | Thickness | Weight lbs. |
|--------------|----------------|------------------|-----------|-------------|
| | A | B | C | |
| MPR 26 | 48" | 26" | 2" | 68 |
| MPR 10 | 29" | 10" | 2" | 29 |

| | | | |
|---------------------|------------------------------|-----------------------------------|------------------------------|
| Material: | 100% recycled rubber | Tensile strength: | 300psi ASTM D412 |
| Fabrication: | compression molded composite | Elongation: | 90% ASTM D412 |
| Density: | 0.6 oz/cu in. ASTM C642 | Brittleness: | -40°F ASTM D746 |
| Durometer hardness: | 65A ASTM D2240 | Coefficient of thermal expansion: | 8x10 ⁻⁵ ASTM C531 |



WORK AREA PROTECTION CORPORATION

www.workareaprotection.com e-mail: workarea@workareaprotection.com

A Division of Stabler Companies, Inc.

2500 Production Drive P.O. Box 4087

St. Charles, IL 60174-9081

630-377-9100

Fax: 630-377-9270

Ordering: 800-327-4417

[54] COUPLING FORMATION FOR THE
INTERFITTING OF STRUCTURAL
ELEMENTS

[75] Inventor: Jacques Rech, Le Chesnay, France

[73] Assignee: Allibert Exploitation, Grenoble,
France

[21] Appl. No.: 127,310

[22] Filed: Feb. 5, 1980

[51] Int. Cl.³ E01C 5/20

[52] U.S. Cl. 52/98; 52/590

[58] Field of Search 52/594, 98, 100, 595,
52/436, 125, 589, 590, 591; 404/41

[56] References Cited

U.S. PATENT DOCUMENTS

| | | | |
|-----------|---------|------------|--------|
| 1,088,040 | 2/1914 | Stanton | 52/595 |
| 1,246,926 | 11/1917 | Hutchisson | 52/125 |
| 1,722,682 | 7/1929 | Rota | 52/594 |
| 2,115,160 | 4/1938 | Fowler | 52/100 |
| 2,560,731 | 7/1951 | Miller | 52/125 |

FOREIGN PATENT DOCUMENTS

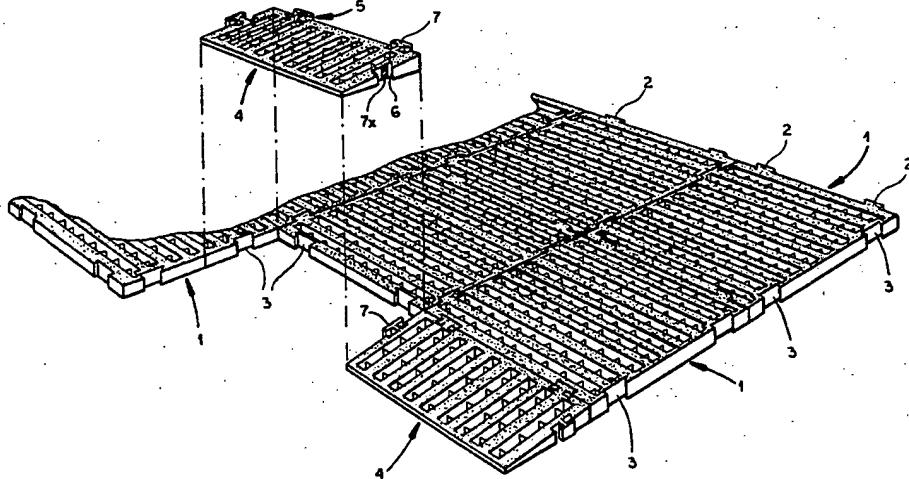
| | | | |
|--------|--------|-------------|--------|
| 138651 | 4/1934 | Austria | 52/98 |
| 703901 | 4/1966 | Italy | 52/594 |
| 157274 | 9/1932 | Switzerland | 52/98 |

Primary Examiner—John E. Murtagh
Attorney, Agent, or Firm—Karl F. Ross

[57] ABSTRACT

A structural element, such as a section of a duckboard (e.g. a landing mat) to be removably fastened to a similar section, has one or more edges provided with male coupling formations adapted to be converted into complementary female formations by breaking off a projecting part thereof. The projecting part is generally T-shaped, with its frangible stem rising from the bottom of a preferably dovetail-shaped recess. Such an element can therefore be readily joined to another element having a mortise complementary to the head of the T or a tenon complementary to the recess.

6 Claims, 3 Drawing Figures



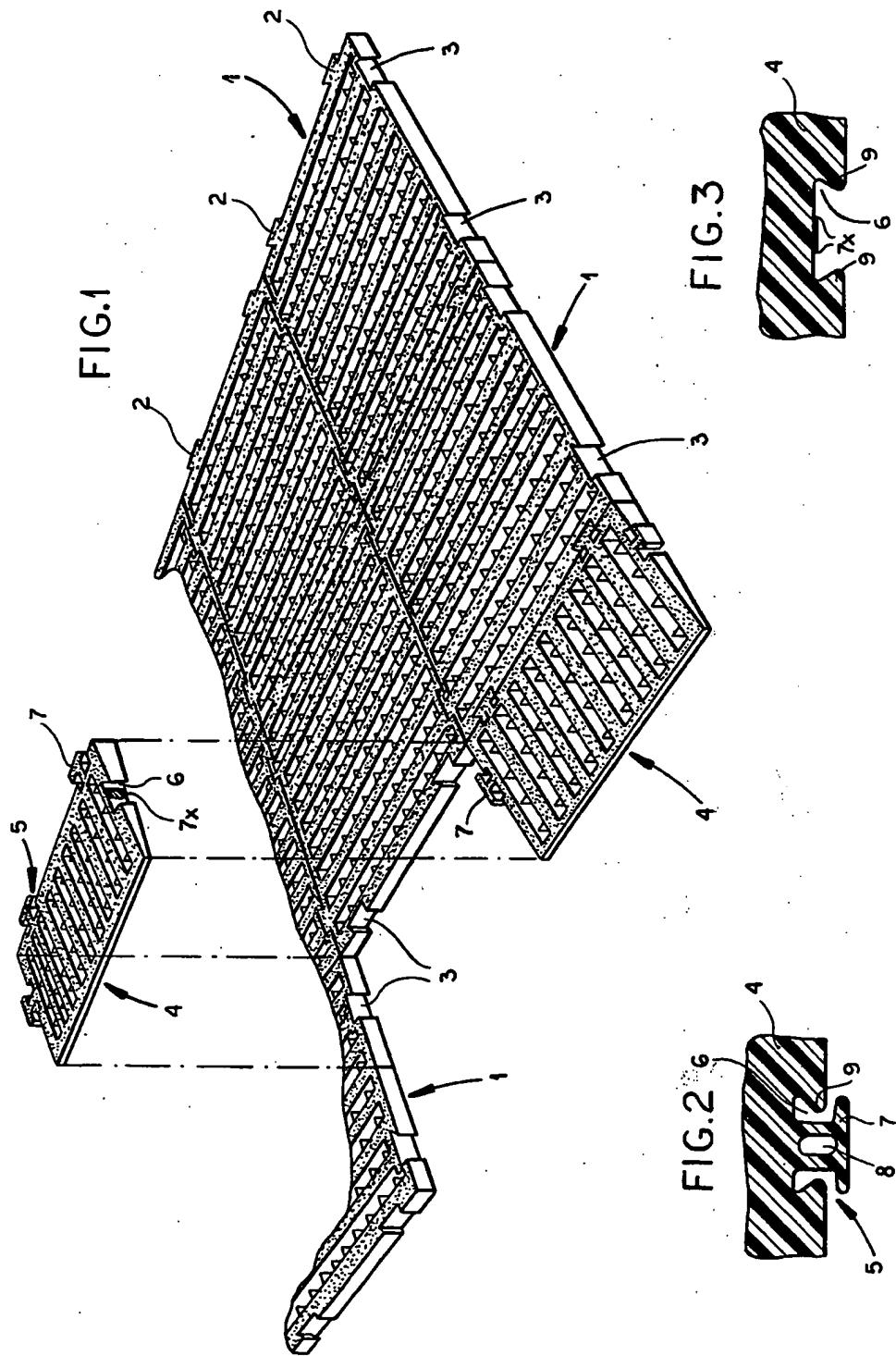
EXHIBIT

D

U.S. Patent

Feb. 15, 1983

4,373,306



COUPLING FORMATION FOR THE INTERFITTING OF STRUCTURAL ELEMENTS

FIELD OF THE INVENTION

My present invention relates to an assembly of structural elements which are detachably interconnected by means of interfitting complementary coupling formations provided on edges angularly adjoining respective faces thereof.

BACKGROUND OF THE INVENTION

In assemblies of this nature it is customary to provide the constituent elements with mutually complementary male and female coupling formations referred to hereinafter as tenons and mortises. In the case of plastic elements, the tenons are molded as integral projections whereas the mortises are simply formed as undercut recesses which are laterally accessible to facilitate removal from the mold as well as insertion of a tenon from an adjoining element upon assembly.

This technique is entirely satisfactory when each structural element has its preassigned place in the completed assembly. In many instances, however, it is desirable to rearrange some of these elements or to add further components of a similar nature in order to meet different requirements, e.g. to fill up a variable area or volume. If the assembly is a mat, for example, it may have to be restructured in accordance with the ground or floor space to be covered. In such an instance, however, it may happen that two tenons or two mortises confront each other when a given component is relocated from one position to another. This makes it necessary to store a significant number of spare components to be used only for certain configurations.

OBJECT OF THE INVENTION

The object of my present invention, therefore, is to provide a structural element of the type referred to with means for facilitating different modes of assembly, thereby reducing the requisite number of spare components and the costs involved in their manufacture and storage.

SUMMARY OF THE INVENTION

In accordance with my present improvement, a coupling formation on an edge of at least one structural element of such an assembly comprises an undercut recess, preferably of dovetail shape, and a generally T-shaped projection rising therefrom to define therewith a hybrid-type coupling formation, the stem of the "T" being frangibly secured to the bottom of the recess while its overhanging head has a profile substantially complementary to the inverted profile of the recess which is exposed at and therefore accessible from a face of the element angularly joining its aforementioned edge. Thus, the coupling formation normally operates as a tenon but can be converted into a mortise by breaking off the stem at its bottom whereupon the laterally accessible recess can receive either a conventional tenon or the head of a similar T-shaped projection on another structural element.

The break-off of the stem is a simple matter in the case of molded structural elements of plastic material.

BRIEF DESCRIPTION OF THE DRAWING

The above and other features of my invention will now be described in detail with reference to the accompanying drawing in which:

FIG. 1 is a perspective view of a mat, referred to hereinafter as a duckboard, assembled from a multiplicity of structural elements partly provided with coupling formations according to my invention;

FIG. 2 is a cross-sectional detail view, drawn to a larger scale, illustrating one such coupling formation in its original state; and

FIG. 3 is a view similar to FIG. 2, showing the coupling formation converted from a tenon into a mortise.

SPECIFIC DESCRIPTION

In FIG. 1 I have shown a representative portion of a duckboard as used, for example, on an airplane runway or in a factory yard as a track for wheeled vehicles. The 20 duckboard consists of a multiplicity of interfitted major sections 1 and minor sections 4, all of rectangular configuration, sections 4 being provided with sloping upper surfaces to act as access ramps for the vehicles to be carried. Each section is molded integral from plastic material and is provided along its edges with coupling formations facilitating its detachable connection to adjoining sections. In the case of the major sections or strips 1, these coupling formations are dovetail-shaped tenons 2 on one longitudinal and one transverse edge and mortises 3 on the other two edges.

The two access ramps 4 shown in FIG. 1, in order to interfit with each other and with the adjoining strips 1 in the illustrated position, must have tenons along their raised rear and left-hand lateral edges as well as mortises on their right-hand lateral edges. If, however, the same ramps were to be used in an inverted position at the opposite end of the track or runway, these tenons and mortises would no longer fit the formations on the confronting strip edges. In accordance with my present invention, therefore, I provide each ramp 4 on its raised rear edge and its lateral edges with hybrid-type coupling formations 5 adapted to be used either as tenons (see particularly FIG. 2) or as mortises (FIG. 3).

In its original state, as shown in FIG. 2, each coupling formation 5 comprises a T-shaped projection 7 whose stem rises from the bottom of an undercut dovetail-shaped recess 6 which is flanked by overhanging surface portions 9 of element 4 that in turn are spacedly overhung by the head of the "T". The stem is advantageously formed with a cutout 8 to increase its flexibility and to facilitate its detachment from the ramp 4 at the bottom of recess 6 to form a mortise with a profile complementary to the inverted profile of the tenon formed by projection 7. The break-off points have been indicated at 7x in FIGS. 1 and 3.

The dovetail profile of recess 6 substantially corresponds to that of mortises 3 on strips 1 whereby that recess can be engaged, with positive fit, not only by a projection 7 of another ramp but also by a tenon 2 of a strip.

Prior to the installation of any duckboard, therefore, it is only necessary to procure (in addition to the requisite number of strips) a number of ramps equal to the number of contemplated access points without regard to their actual disposition. Upon a subsequent change in layout, only those ramps (if any) in which tenons will be needed in lieu of previously formed mortises will have to be replaced.

I claim:

1. In an assembly of structural elements detachably interconnected by means of interfitting complementary coupling formations, said elements including related edges and spaced faces,

the improvement wherein hybrid-type coupling formations on said angularly related edges of at least one of said elements each comprise an undercut recess flanked by overhanging surface portions and a generally T-shaped projection rising from said recess, said projection having a stem frangibly secured to the bottom of said recess and a head spacedly overlying said overhanging surface portions with a profile substantially complementary to the inverted profile of said recess, the latter being exposed at said faces and laterally accessible from

said faces for engagement with positive fit by a tenon of like inverted profile on another of said elements upon break-off of said stem at the bottom of said recess.

5 2. The improvement defined in claim 1 wherein the profile of said recess is dovetail-shaped.

3. The improvement defined in claim 1 or 2 wherein said one of said elements consists of plastic material.

10 4. The improvement defined in claim 1 or 2 wherein said elements are sections of a duckboard.

5. The improvement defined in claim 4 wherein said sections consist of molded plastic material.

15 6. The improvement defined in claim 1 or 2 wherein said stem is formed with a central cutout.

* * * *

20

25

30

35

40

45

50

55

60

65